REMARKS:

Despite the Examiner's new cited reference to Abdollahi et al, each of independent Claims 1 and 20 remains distinguished from the prior art references, considered alone or in combination, in that there is provided a remote field cabinet separate from the central office which communicates with the central office by both a trunk cable containing a plurality of twisted pairs and a bi-directional link separate from the trunk cable.

Neither Eames nor Abdollahi disclose splitting of the POTS signal from the data signal at the remote unit and then transporting the POTS signal in its analog form on a twisted cable pair to the central office separate from the ADSL signals also in analog form over a bi-directional link.

In addition to the distinguishing features already present in the claim, independent Claims 1 and 22 have also been amended to yet further distinguish the present invention by including the ADSL modem at the central office so that the ADSL signals are transmitted in an analog form over the bi-directional link.

The Examiner has cited the combination of Eames disclosing a bi-directional link and Abdollahi disclosing twisted copper pairs to show that these combined features in the configuration of Claim 1 would be obvious. Eames however teaches transmitting both ADSL signals and POTS signals over a common optic fiber designated by character 160 in the figures. Abdollahi supports the teachings of providing a single link for carrying all forms of traffic as best described at column 2, lines 50 through 65 in which the copper twisted pairs are clearly intended to carry data, voice, video and all other forms of traffic. By the combined teaching of these references, it would be clear to one of ordinary skill in the art that only a single link should be used between the central office and the remote terminals unlike the use of signal splitting coupler units of the present invention which clearly describe separate transmission of POTS signals and ADSL signals along a trunk cable and a separate bi-directional link respectively.

The current amendments to Claim 1 regarding an ADSL modem at the central office further distinguishes the present invention as EAMES clearly discloses locating the modem at the remote unit similar to the teaching of Abdollahi. In the configuration of the present invention, the power requirements for the modems can be located at the central office so that all the components of the remote terminal can be powered using minimal power over the communication links to the central office. This differs considerably from the prior art which specifically requires additional power to be transmitted to the remote terminals.

There is simply no disclosure nor suggestion in either Eames or Abdollahi that communication from a remote field cabinet should be divided into two separate components and transmitted along two separate links as set forth above. Furthermore there is no disclosure or suggestion in the cited references to transmits ADSL signals in analog form between a central office and the remote terminals by providing the ADSL modems at the central office. It is respectfully submitted therefore that each of Claims 1 and 22 is presently distinguished from the cited references to Eames and Abdollahi, individually or combined, and therefore Claims 1 and 22 should now be in condition for allowance.

In further consideration of the features of independent Claims 1 and 22, Eames does not disclose the connection of separated POTS signals between the respective telephone line and the trunk cable. In rejecting this portion of the claim, the examiner has cited Abdollahi, however Abdollahi claims a method of limiting the simultaneous call processing in the remote units so as to limit the power requirement. In column 2, lines 60-65 and column 3, lines 1-3, he discloses that power for the remote units is supplied from a network power source (18) over trunk cable twisted pairs (20) and (24). In column 2, lines 56-60 and column 3, lines 3-5, he discloses that telecommunications traffic in the form of data, voice and video are carried on twisted pairs (19) and (25). Eames uses a similar structure except that the telecommunications traffic in the form of data, voice and video are carried by optical fibers (160).

Abdollahi utilizes POTS line cards in the remote unit as described in column 3 lines 49-56 and a subject of the disclosure is the limitation of the power required to ring the subscriber telephones and to provide off-hook loop current as described in column 3 lines 17-23. Eames also utilizes POTS line cards in the remote unit (520). In both cases, the analog POTS signals are not communicated to the central office in their analog format.

Abdollahi in column 3, lines 24-47 describes the remote access multiplexing terminal 17 as having DS1, T1 or HDSL (1.544 Mb/s) digital transport to the central office, a DS0 (64 kb/s) timeswitch (that can provide statitistical multiplexing) and line cards that either provide digital transmission to the subscribers (at 64 kb/s) or generate POTS service for the subscribers. There is no transport of analog POTS signals to the central office nor is there transport of subscriber data signals in their analog form between the remote terminal and the central office.

In Claims 1 and 22 of the present invention, there are a plurality of connectors arranged to connect the separated voice frequency POTS signals between the respective individual telephone line and the trunk cable. The POTS line cards are located at the central office and there is no need for concern about their variable power requirement. The analog POTS signals (voice, ringing and off-hook supervision) travel directly from the subscriber to the central office without the intervention of the remote unit. Between the central office and the subscriber, the voice signals remain in their analog format and are not digitized and multiplexed with data and video signals. This provides much higher reliability since the "lifeline" voice service is unaffected by remote power loss or failure of the remote electronics.

Thus, the structure of the claimed invention substantially differs from Eames in that the voice signal and all associated signaling such as ringing, dialing and off-hook are transmitted to the customer solely on the copper pairs and there is no intermediate transmission on a broadband medium such as optical fiber. Voice signals are not carried by ATM cells (as per Eames Claim 1) and voice information is not carried in a division multiplexed (TDM) format as indicated in Eames Claim 1 and Claim

6. Furthermore, in the present invention there is no regeneration of ringing, dialing or supervisory signals at the remote unit as described in Eames Claim 11.

In summary, while Abdollahi has shown the use of cable pairs for supplying power to the remote unit, neither Eames or Abdollahi has not shown our method of *splitting* the POTS signal from the data signal at the remote unit and then transporting the POTS signal, in its *analog form*, on a twisted cable pair to the central office. The analog POTS signals (voice, ringing and off-hook supervision) travel directly from the subscriber to the central office without the intervention of the remote unit. Between the central office and the subscriber, the voice signals remain in their analog format and are not digitized and multiplexed with data and video signals.

Regarding the rejection of Claim 2, the filter (360) described in Eames column 5, lines 34-38 is at the customer end and is required for traditional ADSL installations as well as our implementation. Our Claim 2 describes a similar filter that splits the line signal and couples the POTS signals from the individual telephone line through connectors to the trunk cable. Our filter also separates ADSL signals from the individual telephone line and couples these signals to the frequency translation units.

Abdollahi does not describe any such filter at his remote units (17) and (22). Eames, in column 10, line 63 – column 11, line 10, does not describe a filter at his remote units (340) (520) and (620) but rather describes a downstream common bus, downstream payload and upstream individual busses. These busses carry POTS and ADSL signals *together* and not in the separated manner that we use. Eames does describe an alternate embodiment in Figure 12A and in column 12, lines 44-55 that includes a POTS/ADSL splitting filter. The POTS signal is digitized by POTS circuit (656), combined with the VDSL digital signal by the VDSL system ASIC and the *combined* signal at (652) is then carried by the fiber optic transport.

Regarding the rejection of our Claim 4, we describe a directional hybrid coupler to interface the (individual) bidirectional metallic telephone line to the unidirectional fiber optic links. Eames, in column 4, lines 33-38, describes a hybrid coupler to interface to a bidirectional optical link.

Regarding the rejection of our Claim 5, column 11, lines 36-43 and Figure 11 of Eames describe the provision of power from the remote USAM unit (660) to the

customer over the individual telephone line (180). A reference to provision of power from the central office to the remote USAM unit could not be found in the disclosure. The power source for power supply A and power supply B of Figure 10 appears to be the local power utility and not the central office.

Regarding the rejection of our Claim 6, no reference to 6 MHz could be found within US 6,208,637. The description provided in column 8, lines 28-44 relates to the transmission of VDSL signals on the individual telephone line and not to transmission of signals on the bi-directional (optical) link.

Regarding the rejection of our Claim 7, the ADSL System (654) communicates ATM cells over the optical fiber. It does not locate ADSL signals within frequency bands on the optical fiber link (160). Eames column 11, lines 44-55 describes the VDSL modem (660) at the remote USAM (340) and describes the downstream common bus (with ATM cells) and the upstream individual bus (also with ATM cells). There is no mention of video channel frequency bands.

Regarding the rejection of our Claims 8, 9 and 10, Eames column 10, lines 10-36 describes transmission on the individual telephone line (180) and not on the broadband transmission link to the central office (160). Our invention uses the frequency bands and transmission equipment of cable television but the ADSL signals traveling between the remote USAM to the central office do not co-exist with conventional analog TV signals. Inoue's invention does not apply to our use of the transmission medium.

Regarding the rejection of our Claims 11, 12 and 13, Eames column 9, lines 60-64 does describe that the optical link may be replaced with a coaxial cable link or a wireless link, but the remote USAM unit does not transmit upstream and downstream signals in different frequency bands on the coaxial cable. While Eames remote USAM has narrowband, broadband, VDSL and ADSL linecards as described in column 9, lines 35-64, the remote unit in our invention has none of those. Our invention transmits upstream and downstream ADSL signals in different frequency bands on both the individual twisted pair telephone lines and also on the fiber optic or coaxial line between the remote unit and the central office.

Regarding the rejection of our Claims 23 and 24, the ADSL signals transported between the remote unit to the central office are in the modulated format intended for transmission on the individual twisted pair telephone lines except that these signals have been frequency translated or modulated so that each individual telephone line communicates with the central office in a different frequency band. In the Eames patent, the broadband digital terminal (130) has digital interfaces to fiber optic transmission and to STS3c copper transmission. All communication signals are in digital form. There are no modulated high frequency carriers on the link between the central office and the remote terminal. The 0-4 kHz POTS and the 25kHz-1100kHz ADSL signals exist only on the individual twisted pair telephone lines extending from the remote unit to the customer premises.

Regarding the rejection of our Claim 25, the Counterman patent shows in Figures 7, 8, and 9 an inverse multiplexer that uses TDM (not FDM). ADSL signals are first demodulated to s digital bit stream and then multiplexed into a higher rate bit stream by the inverse multiplexer.

Regarding the rejection of our Claim 26, Eames Figure 12A illustrates line card 760 which includes a VDSL modulator/demodulator (modem) that converts the analog signal on the individual twisted pair telephone line to an ATM digital signal at point 652 for transmission on the broadband link from the remote USAM unit to the central office. In addition there is a POTS circuit that provides an analog/digital conversion for digital transmission to the central office. Digital transmission avoids interference between the many ADSL signals communicated by the remote unit. There is no modulation of high frequency carriers, carriers that are separated in frequency.

Regarding the rejection of our Claim 27, Eames column 6, lines 6-12 describes line cards that interface to the PSTN and that their power supply is the same as in the remote USAM. In this arrangement, POTS service will fail if there is failure in the power supply, the line card or the digital transmission equipment. Column 11, lines 56-65 and the following paragraph describe the provision of power from the remote USAM over individual twisted pair telephone line (180) to the customer premise.

Column 12, lines 56-67 describe the provision of alternate sources of power and an optional battery pack to provide power in the case of ac power failure in the residence. Eames has no discussion of power loss at the USAM, failure of line cards at the USAM, or failure of the broadband transmission link to the central office all of which will result in failure of POTS service. Our invention is distinguished by the transmission of POTS signals on copper trunk cables and the separate and independent of ADSL signals on the broadband transmission link. While power failure or transmission equipment failure will cause failure of ADSL service, POTS service remains unaffected.

Regarding the rejection of our Claim 28, Eames column 10, lines 37-47 describe 32 ADSL or VDSL circuits per shelf at the remote USAM and column 8, lines 35-40 describe the full downstream rates of each transmission format as 9 Mb/s and 26 Mb/s respectively. The aggregate DSL bit rate is then 288 Mb/s or 832 Mb/s. Column 9, lines 35-45 describe the bi-directional optical link as having a transmission rate of 155 Mb/s. Clearly, the Eames invention relies on statistical multiplexing (otherwise known as concentration) since the full DSL rate of all individual telephone lines (180) is greater than the capacity of the optical link (160). As further evidence, column 13, lines 36-59 describe the transmission format between the central office and the remote USAM as asynchronous transfer mode (ATM) which is well known for its ability to provide statistical multiplexing. Our invention is distinguished by having an individual frequency band for each ADSL signal so that the full rate transmission capacity is available to all ADSL circuits simultaneously. Video transmission is characterized by high bit rate and long hold times. While our invention can support simultaneous video service to all users, the Eames invention, as described, will support simultaneous full rate ADSL transmission to only about one-half of subscribers.

Regarding the rejection of our Claim 29, Abdollahi does describe the provision of power from the central office to a remote unit via the twisted pair wires in the trunk cable. It was not obvious to Eames that elimination of the POTS line cards that provide loop current and ringing would eliminate much of the power requirement of the remote USAM unit. In addition, our invention significantly reduces power consumption by also eliminating the ADSL modems at the remote unit. Power is further reduced by not requiring fans or other environmental conditioning. Only by reducing

power required by the remote USAM unit, was it feasible to provide power over the twisted wire pairs of the trunk cable.

Respectfully submitted

DAVID E. DODDS ET AL

PER:
Ryan W. Dupuis
Registration No: 47,345

ADB/ll
September 29, 2004
Adrian D. Battison Winnipeg, Manitoba, Canada
Telephone (204) 947-1429 - FAX (204) 942-5723

CERTIFICATION OF FACSIMILE TRANSMISSION

I hereby certify that this paper is being facsimile transmitted to the Patent And Trademark Office on the date shown below.

LYNN LEATHERDALE

Lynn Leatherdale DATE: Sept. 29/04